ASSEMBLY FOR GUIDING TOY VEHICLE

This invention relates to a toy with educational uses and in particular, but not exclusively, to an assembly for guiding a toy vehicle.

One of the primary aims of the invention is to improve on the established format of track formation that is provided by most toy vehicle systems.

According to a first aspect of the invention there is provided an assembly for guiding a toy vehicle, the assembly comprising a plurality of substantially rectilinear track elements and a plurality of connector elements formed separately from said track elements, each track element having three or more edges, and each edge having a shaped recess for receiving and retaining one end of one connector element, such that, in use, the connectors releasably retain the abutting the track elements with the ends of abutting edges in alignment.

Known track elements of this general type each have a jigsaw type combination of "male" and "female" connectors integrally formed with track element. This limits the number of orientations in which the elements can be connected to other elements, whereas the assembly according to the invention described above is not limited in this manner.

Each track element may be provided with a single track-defining formation such as a groove, rail, or the like, or each track element may be provided with two or more track-defining formations to allow the vehicle to be guided along two distinct pathways, the track-defining formations being configured and positioned to facilitate alignment of the pathways between abutting track elements. The track defining formation may also take the form, for example, of a, possibly hidden wire which defines an electromagnetic path or even simply a surface marked path which could be pre-printed, but could also be user defined, whether drawn or using stickers, which merely visually identifies the path to the user.

The invention differs from the established means of creating a toy of this type which uses sections of connecting track pieces each providing a single pathway for the vehicle. An assembly according to the invention utilises rectilinear track elements which are more robust and easier and quicker to assemble in a coherent way to create a complete circuit or loop, than conventional track elements. Further, the multiple pathways defined on each track element make it simpler to create or change a complicated track layout, allowing the user more "playing time".

Once the track elements are connected together each unique configuration of track elements immediately becomes a robust playing surface that can be moved and stored in its entirety, either flat, folded or in sections. Also an assembly of this type is more robust than the conventional equivalent which is made up of a number of discrete track elements, each providing a single track pathway for a vehicle.

Preferably both main faces of each track element are provided with two or track-defining formations, the track-defining formation being configured differently on each face. The track elements according to this embodiment of the invention are reversible. Alternatively the other main face of the track element could have information printed on it conveying an appropriate educational or promotional message, such as a storyboard, or it can be provided with a surface that can be written on or drawn on by the user.

The track-defining formations preferably comprise a pair of equi-spaced grooves.

The individual track elements of the assembly may be formed from wood, but almost any rigid or semi-rigid board material, such as plywood, laminated chipboard or a plastics material, could be used. The use of a semi-rigid or flexible foam material, such as EVA foam, has a number of advantages: each track element is light and easily transportable; the track elements have no hard or sharp edges that might cause injury; the play surface that it creates provides a quieter playing surface than those made of wood. It is also advantageous to manufacture the track elements from a material that can be re-cycled.

Although the track elements of the assembly may be square they may be, for example, rectangular, triangular or hexagonal. In a preferred embodiment connecting means are associated with each edge of each track element, and the connecting means are positioned and configured to allow any edge of a track element to be connected to any edge of another track element with a pair of parallel edges of the conjoint track elements in alignment.

In a preferred embodiment each connection means comprises pairs of shaped-recesses formed in the abutting edges of the track elements and a connector of complementary shape. The recesses are preferably compatible for connection with known track pieces of other systems.

In a preferred embodiment, one or more secondary elements are provided, each secondary element having an upper surface and a lower surface, the lower

surface having formations for complementary engagement with track-defining formations, such that, in use, the secondary formations overlie some or all of a pathway on a track element.

The upper surfaces of secondary elements may present educational information to the user, and preferably a number of secondary elements are provided with related informational content. For example, one set of secondary elements could relate to a clock face, allowing the user to construct a complete clock face from a number of component parts. Alternatively the upper surface of each secondary element could be provided with, say, a gear wheel, allowing a gear train to be constructed by the user by positioning the secondary elements in a suitable arrangement. Any number of alternative uses for the upper surface of the secondary elements can be found. The combination of the track elements and the secondary element enhances the educational value of the assembly without detracting from the enjoyment of the user.

According to another aspect of the present invention there is provided a connection member for use in association with track elements of an assembly for guiding a toy vehicle, the connection piece comprising a central body having enlarged end sections, said end sections being shaped so as in use, to be engageable in complementary shaped recesses formed in the track elements, the connecting member, in use, extending between adjacent track pieces with each end section engaged in a recess formed in one of the two track pieces so as to secure said pieces together.

The aim of this aspect of the invention is to provide a simple and effective means of connection between track elements that is safe and easy to use. More particularly, the connecting member is of generally dumbbell shape, in particular with dovetail end sections which may be of, for example, circular or oval cross-section and which are co-planar with each other.

A connection piece according to this aspect of the invention has numerous advantages over the most common connection system used in this type of product that comprises a recess in one track element with a complementary protrusion integrally formed with the mating track element, but in particular there are savings both in terms of materials and costs that result from not having to cut down oversize track elements in order to cut away the waste required to form the integral protrusion.

The connection piece may be formed from a compressible material and configured to fit into the recesses on the track elements only in a compressed form to provide a secure fit between track elements.

In a preferred embodiment the main body has a basal flange. The flange increases the overall size of the connection piece to eliminate the chance that a small child could swallow the connection piece, and it improves the functionality of the connection piece by reducing and controlling vertical movement relative to the track elements so as to prevent pull/push through and resulting unevenness or destruction. Upward vertical movement of the connection piece might obstruct the passage of the toy vehicle, and downward vertical movement of the connection piece, for instance on a soft surface such as a carpet, can allow the upper faces of the track elements to become vertically misaligned and thereby prevent smooth passage of the vehicles across the boundary between track elements. The flange underlies the track elements and thus supports the track elements above the surface supporting the assembly to protect the underside of each tile from abrasion or damage. Superior traction of track elements on hard/slippery surfaces is also achieved since instead of the entire weight of a board being spread over a board's entire surface area and being fully in contact with the supporting substrate, in which case the load per unit area is very low and would have a tendency to slip/slide, the flanges create points of greater load, where boards are supported by connectors, the friction at the interface of the base flange and supporting substrate then being considerably greater and therefore more likely not to slide about. The support of the track elements on the flange also serves to increase the stability of the assembly partially when there is a loose fit between the toggle and the track piece, such as when used with existing track pieces. Also, the need to place the track elements on to the connection piece rather than the connection piece in to the recesses reduces the chance that the fingers of the user may become caught or stuck as the assembly is put together.

The flange may alternatively extend from, for example, the middle of the connector so as to form a skirt. The portion of the connector which extends below the skirt could, then, for example be pressed into a soft surface to anchor each connector in position. This form of connector would also be better suited for use as on an uneven terrain.

In a further development, the flanges may be expanded to connect with the flanges on neighbouring connectors so as to form a continuous mat or web from

which the connectors protrude in predefined positions. Track elements may then be positioned on the mat with their recesses engaged with the connectors, and, once the track layout is complete, the mat may be folded up with the track in place for compact storage whilst enabling the mat later to be unfolded with the track layout still intact.

The end sections of the connection piece may be solid, or they may be hollow. The hollow end sections can be used to accommodate other elements of the assembly, such as pegs carried on surface mounted accessories or support struts that might be used to support multi-layered constructions so as to provide a positive mounting thereon, and the devices such as signal or trigger devices, which might be magneto, electro, optical, mechanical or audio activated or the like.

The end sections of the connection piece may be rigidly connected but are preferably flexibly connected. The flexible connection of the end sections allows conjoined track elements to be folded over to overlie one another, back-to-back or face-to-face, whilst they remain connected. This arrangement facilitates storage and transportation of track element assemblies. The flexible connection may be achieved by forming the connection member as two separate parts, each part including one of the end sections and a portion of the central body. The two parts are then either connected together by a double hinge such as a double living hinge, that is a hinge which allows uni-axial rotation in two directions, preferably through 180° in each direction hinge or includes an elastic member extending between the two of them which urges the two parts into engagement with the portions of the central body aligned but which enables constraint movement of the two parts relative to each other so as to permit the connection member to be folded.

Each end portion advantageously also includes at least one recess, such as a hole, formed therein, for mounting accessories such as scenery in the form of trees, building or the like, or for attaching locking means which lock each together against being folded and/or eliminate finger/hand trapping risk when folded. These recesses could also be used to lockingly receive struts by means of which the connectors and hence the track pieces may be suspended, for example, from a ceiling, shelf or the like.

According to the broadest aspect of the present invention, there is provided an assembly for children's entertainment comprising a plurality of substantially rectilinear elements and a plurality of element connectors, each element having three or more edges, and each edge having a shaped recess for receiving and retaining one

end of one of a connector, such that, in use, the connectors releasably retain abutting elements in aligned engagement. Rather than being used as a track for a toy vehicle, the elements of the assembly could be used, say, as construction elements in a building orientated toy.

The track pieces and/or end connectors may be formed of plastic, rubber, wood and/or any other suitable manmade or natural material.

A clear understanding of the various aspects of the present invention will be gained from the following detailed description, given by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a plan view of a track element according to the invention;

Figure 2 is a cross-section through the line AA of Figure 1;

Figures 3 and 4 show a number of conjoint track elements in different configurations;

Figure 5 is a perspective view of a connection piece with a basal flange;

Figure 6 is a plan view of the connection piece of Figure 5;

Figures 7a and 7b are views along the lines AA and BB of Figure 6 respectively, with Figure 7b showing an exploded view of the component parts of the connection piece;

Figure 8 shows an illustrative view of an alternative embodiment of the connection piece;

Figure 9 shows an illustrative view of a connection piece in use;

Figure 10 shows a side view, partially cut away of an assembly;

Figures 11a, b, c and d show illustrative cross-sectional views of parts of track elements;

Figures 12a and 12b shows a plan view of a bespoke track element suitable for incorporating further elements, such as bridges or the like; and

Figures 13 and 14 show alternative shapes for track elements and their interaction;

Figure 15 and Figure 16 show alternative track element configurations;

Figures 17a to 17h show illustrative views of alternative connector configurations;

Figures 18a to 18g show various pathway configurations that can be adopted;

Figures 19a to 19d show a particularly preferred embodiment of the connector of the invention; and

Figure 20 shows yet another embodiment of the connector of the invention.

With reference to Figure 1 a square tile or panel, generally designated 1, has a generally uniplanar upper face 2 and four edges 3a to 3d. The upper face 2 has a multitude of tracks or channels 6 (see Figure 2), and equi-spaced pairs of tracks 6 define ten or more pathways 4a to 5e and 5a to 5e traversing the tile 1 from one edge to the parallel edge. Each pathway has an entry point E_1 and an exit point E_2. Although the entry and exit points E_1, E_2 are shown to be connected by straight tracks 6, it will be understood that the tile shown in Figure 1 simply illustrates the general configuration of pathways and entry/exit points, and the tracks could follow any path between the entry and exit points, subject to the constraint of the turning circle of the toy vehicle.

However it is preferred that a standard location of the entry and exit point E_1, E_2 etc. relative to the tile edges is adopted to facilitate the alignment of track between adjacent tiles. By equi-distant spacing of the tracks can be used to define a further sub-set of pathways 7.

In theory any number of tracks can be formed on each individual tile, but in practice a practical limit is defined by the width of the tracks as, beyond a certain point, the tracks will merge with on another and lose coherence. Nevertheless, the assembly provides a track density that is many times greater than known systems. As number of difference configurations of track are shown in Figure 18;

Figure 18a shows a general tile with the most commonly used pathways, although it will be appreciated that a single tile will not include all of the possible pathways depicted;

Figure 18b shows a tile with the tracks marked in bold defined on the tile surface, and defining a 'long' switch arrangement;

Figure 18c and 18d show 'short' and 'return' switch arrangements respectively;

Figures 18e and 18f show 'return' and 'universal' loop arrangements respectively;

Figure 18g shows a '5-splitter' arrangement.

The lower main face 3 of the tile can also be provided with tracks. The pathways on the lower face 3 have a different configuration to those on the upper face 2, and the tiles can be reversed. Figures 3 and 4 show some examples of assemblies of tiles with different pathways, and with the tiles arranged to define part of a circuit

of the toy vehicle. The left hand tiles show the upper face 2 and the right hand tiles show the lower face 3 of each tile.

Each tile edge 3a to 3d has shaped recesses 8 in the region of the each corner. Each recess has a bulbous inner part 10 of generally circular cross section, and a narrower neck part 11 that communicates between the inner section 10 and the edge of the tile 3.

The recesses 8 are centrally located between the tracks 6 of the outermost pathways 4a, 4e, 5a and 5e and they are equidistant from the corners of the tile. This arrangement allows any edge of any tile to be connected to any edge of any other tile with the outermost edges of the tiles aligned. Other suitable arrangements of recess location, such as a single centrally located recess would be equally efficacious. A connector or toggle for holding the tiles together is described in more detail below.

As can be seen from Figure 4, not all of the tiles in the assembly need to be square; the lower tiles shown in Figure 4 are rectangular with a pair of minor edges being half the length of two major edges. One of the minor edges is provided with additional recesses 8' to allow connection of the associated pathways on the tiles with the track pieces of other types of track systems. The tiles show in Figures 13 and 14 are triangular and hexagonal. It is generally preferred that the tiles are shaped to allow tessellation.

Figures 12a and b shows another tile configuration that could be used, say to incorporation bridges or other track features.

The pairs of tracks 6 which form each pathway could be replaced by a single channel 9 (see Figure 11c), a pair of raised protrusions, simulating railway tracks, or a single protrusion, simulating, say, a road way.

The spaces in between each track can be coloured and graphically enhanced to create scenery or other picture and further enhances the attraction of the assembly.

A connector or toggle, generally designated 20 (see Figures 5 and 6) has opposed end portions 21 connected by a central spar or bar 22. The end portions 21 and bar 22 have a cross-sectional shape which complements the shape of the inner part 10 of the recesses 8 and the neck part 11 respectively. The bar 22 is approximately twice the length of the neck part 11 or the recesses, so that the toggle 20 holds connected tiles in close abutment.

Although the cross-sections of the inner part 10 of the tiles and end portions 21 of the toggles 20 are shown to be circular, it will be understood that the shapes

dove-tail together and any shape could be used, provided the shapes are complementary and the maximum width of the inner part of the recess is greater than the maximum width of the neck part 11. Similarly other shapes could be used for the neck part 11 and the bar 22.

Toggle 20 preferably has a flange-like panel 23 that provides a circumjacent lip at base of the toggle. The toggle could be a one-piece construction, but it is preferred that a three piece construction is used, with upper and lower panels 24 and 26 and a central body portion 25 (see Figures 7a and 7b). The three parts of the toggle are formed for releasable 'snap-fit' engagement, and the may be supplied to the user ready assembled or in a kit form.

A toggle could be provided two lower panels 26, both having flanges. One of the panels 26 can be attached to the toggle body 25 after the toggle is attached to the tiles so that, in use, the flanges sandwich the interjacent part of the tiles and hold the tiles in secure engagement. Alternatively, the toggle can be formed of resilient material and forced into a 'push-fit' engagement with the tile recesses. This form of toggle could be of particular use if the tiles are used as a construction-type toy where the tiles are used as building panels to form, say, a house. The 'double-flanged' toggle offers a secure connection between the tiles, even when the tiles are vertically orientated. The toggle with two flanges could also be used where a more secure connection is required between tile used in a toy vehicle assembly, and for instance where a semi-permanent assembly is created.

Figure 8 depicts an alternative toggle, generally designated 20'. The overall shape of the alternative toggle 20' is the same as the toggle 20, and it is made up from a three-piece construction. However, the toggle 20' has two distinct end pieces, each with a flange 23' connected to an upright cylindrical tube 21'. The tube 21' has a mouth or slot running along its length for receiving a flexible central membrane 22' of similar overall shape to the main body of toggle 20. The two ends of the membrane 22', which are themselves hollow cylinders, are each received and retained in the tubes 21' and the membrane serves to hold the end pieces 21',23' in alignment. The end pieces 21', 23' can be identically configured to reduce manufacturing costs.

The flexibility of the membrane may be increased by providing a cut-out section between the two ends of the membrane, such that the central section of the membrane comprises upper and lower beams or struts (see Figure 2).

The alternative toggle 20' provides an articulated joint between two tiles so that the tiles can be moved into a position with their main faces in confrontation without removal of the toggle 20'. As a result the alternative toggle 20' allows large assemblies to be stored compactly and transported easily.

Figure 17 depicts further alternative toggle configurations. Figure 17b shows a plan view of an alternative toggle generally designated 20". The toggle is a one-piece construction formed from a resilient flexible material, such as rubber. Figure 17d shows a side view of the toggle 20" (the other side view corresponds), and Figures 17a and 17c show central transverse and longitudinal sections. A single circumjacent flange 23" of uniform width surrounds the end portions 21" and central section 22". A cut away section 24 of the flange 23" defined between the two end portions improves the flexibility of the toggle 20", as does the narrowed waist portion 25 adjacent the cut away section 24.

The upper part of the central section 22", here designated as 26 is an inverted C-section. The arms 40 of the C-section increase the resistance of the toggle 20" to lateral and torsional movement. The outer surfaces of the arms 40 can also serve to form an engagement surface with ornamental inserts.

The toggle 20"' of Figures 17e to 17h has a similar configuration to the toggle 20", but a removable central section is provided and the end sections of the toggle 20"' are separately formed.

As shown more clearly in Figure 9, the toggles 20" and 20"' are configured in the region of the interface between the end sections and the upper part or strut 26 of the central section to assist in folding of the toggle. Particularly, the confronting walls of the end portions are narrower in width than the outer walls, and the width of the confronting walls narrows further in the region of the interface. The interface region is shaped such that, in a folded configuration shown in Figure 9, the upper side of the strut 26 lies in close abutment with the adjacent part of the inner walls of the end portions so that a more compact folded arrangement is achieved.

The hollow end sections 21 of the toggle can be used to mount accessories, such as signal post or the like on the board. The upper panel 24 of the toggle 20 can be removed and the end of the accessory inserted. Other accessories could include rods 27 for supporting one layer of tiles above another. The respective upper and lower panels 26,24 of confronting toggles 20 can be removed and the rod 27 inserted. Abutments 28 hold the tiles 1 in the correct vertical alignment (Figure 10).

With reference to Figure 11, a number of inserts or inlays may be provided. The inlays 30a to 30f are configured with projections for engagement with the tracks 6 or channel 9, or they are sized to fit within the tracks or channels. The inlays may be coloured, pre-marked or blank for writing on. Inlays like 30f are narrower than the channel 6 and they may be used to create the impression of 'rails' for the user. In addition the inlay 30f may be coloured to distinguish between different pathways on the assembly of tiles.

A large variety of different pre-printed inlays can be envisaged to increase the educational benefit of the assembly. For instance with tiles suitably arranged to provide a circular pathway, pre-printed inlays of corresponding shape can be provided with the various elements of a clock face. The user can then assemble these elements under supervision.

Referring next to Figure 19, there is shown a further embodiment of the toggle of the invention which is configured to be easily foldable so as to enable an assembled track easily to be folded up for compact storage. The toggle 120 of Figure 19 is formed of two separate symmetrical portions 121a, 121b, each portion carrying on end part 122 of the toggle 120 and a portion of the central bar 123 which extends between the end parts 122. Each half 121a, 121b of the toggle also includes a base flange 125 as previously described. An elastomeric member in the form of, for example, a rubber band 124 is connected to and extends between the two end portions, the band having circular ends, each of which is received in an annular recess formed in each end part 122 of the toggle 120 so as to anchor the band 124 to each end portion. The tension in the band 124 thereby urges the two end portions together with the two halves of the central bar 123 aligned as shown in Figure 19a, whilst permitting the toggle to be folded in half either in a first direction to bring the base flanges 125 of the two portions 121a, 121b into face to face engagement as shown in Figure 19c, or in a second direction to bring the upper ends of the end portions 122 into face to face engagement as shown in Figure 19d. This arrangement thereby enables neighbouring track pieces to be folded together in order to fold up a particular track array for compact storage.

As with the previous embodiments, each end part 122 includes a recess in its upper end in which may be received a mounting post of a piece of scenery or the like, but in which is preferably received a locking plate which extends between the two end

parts 122 so as to prevent relative movement therebetween whilst also possibly forming an upper flange which prevents track pieces lifting up relative to each other.

As shown in Figure 19b, the top of the end part 122 carried on each toggle portion 121a, 121b has a hinged lid 1265 which is raised to enable access to the annular recess formed therein so as to facilitate proper locating of the spring band within said recess.

Figure 20 shows a further embodiment of the toggle which is identical with the embodiment of Figure 19 except that the two portions of the toggle are connected together by a double live hinge of a type well known in the art which enables the two portions to be folded laterally onto each other about the pivot axis, in the same manner as the toggle of Figure 19, either in a first direction so as to bring their base flanges in abutment or in the opposite direction so as to bring the upper faces of their end sections into engagement. A recess in the form of a central, axially extending hole is also again formed in each end part for engagement of a locking plate, scenery or the like.

In this arrangement, the separation between the end parts of the toggle may be slightly smaller than the separation between the aligned recesses of neighbouring track pieces so as to place the hinge connection between the two portions of the toggle into tension and hence remove any play which exists in the hinge due to manufacturing tolerances.

In the case of all the described embodiments, the end parts and associated recesses formed in the track pieces are preferably sized to have a close tolerance fit, thereby ensuring that the track pieces are securely fastened together. The size of the end parts of the toggle is also preferably set so as to be no bigger than the size of the recess in existing third party track pieces, thereby enabling it to be used with existing third party track pieces, albeit possibly with a loose fit between the end parts of the toggle and the recesses formed in existing tracks.

The tracks 6 or channels 9 of the tiles may be formed by milling or otherwise cutting the grooves into the tiles. Cutting the grooves allows for greater flexibility of track layout and for the production of bespoke tiles if required. Alternatively, and where the material allows, the tiles may be preformed or moulded with grooves by processes such as injection moulding.

Figure 15 shows a novel tile configuration. A raised section 50 is stamped or integrally formed with the tile 1 to provide a downhill ramp for a vehicle. The raised

section can be in the form of a spiral, and the pathway defined by the raised section is contiguous with a pathway on the planar section of the tile with surrounds the raised section.

The skilled person will understand that modifications to the exemplary embodiments of the invention described above can be made without departing from the scope of the following claims. For example, the lower main face 3 of each tile could be provided with a reusable surface, such as a 'dry-wipe' board, so that when the board is reversed it provides a large area for the user to draw or write on. Alternatively the lower main faces 3 of a number of tiles could be pre-printed with a storyboard or a game, such as snakes and ladders.

Also a track element could be divided transversely into a number of distinct parts, with each part being flexibly connected along an axis substantially at a right angle to the transverse division. This arrangement would allow the tile to be moved between a flat configuration and a configuration where the cross-section is generally S-shaped and thus link different horizontal layers of tiles.